

IWR White Paper

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Online Education Technologies



US Army Corps
of Engineers®

IWR

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Executive Summary

Online Education Technologies

The Corps of Engineers' Institute for Water Resources (IWR) currently teaches a PROSPECT Course on *Risk Analysis for Water Resources Management and Planning*. Furthermore, there are online, self-paced courses that focus on risk analysis through the **Corps Risk Analysis Gateway**. However, IWR was interested in improving these modules based on the latest research in online education for adults. Specifically, IWR tasked CDM Smith with researching and evaluating various online options for educational initiatives that could improve the training available on the Corps Risk Analysis Gateway. While not the paper primary intent, many who work on training may also find this research relevant.

CDM Smith has a corporate university, accredited by the International Association for Continuing Education and Training (IACET), since 1996 and has a number of degreed learning professionals who plan and create new courses and curricula in virtual, blended, and instructor-led formats. Using CDM Smith University's expertise, industry knowledge, and discussions with IWR, technologies were researched to identify benefits, considerations, and recommended uses to create the selections presented in this report. Each chosen technology was evaluated using criteria determined by IWR.

CDM Smith suggests choosing options that best meet the organizational needs of the U.S. Army Corps of Engineers' (USACE) based on the level of learning needed, number of participants, how participants will access the content, level of effort and cost. Using a blended approach that delivers content in different formats, at different times, helps to reinforce the training content and deliver an overall learning solution. Many organizations, including CDM Smith, often use a blended approach (i.e., incorporating multiple delivery methods) to achieve learning outcomes.

The technologies researched, per IWR guidance, are summarized in the table below. They are listed in order from high to low with regard of effort to create and time commitment for implementation.

Table 1. Online Education Technologies

Online Education Technology	Description	Benefits	Considerations/Approved Software Information
Learning Management System (LMS)	A LMS is a platform that supports registration, tracking, reporting, evaluation, and delivery of online courses.	<ul style="list-style-type: none"> Automates administrative training tasks. Provides self-service tools for career development. Provides training opportunities to all staff via online courses. Provides reporting for training analysis and planning. 	<ul style="list-style-type: none"> The cost and time for the implementation (planning, coordinating, testing, communication, etc.) would be significant. IWR would need to create an infrastructure to manage the system. IWR would need approval and help from ACE-IT to implement new features.
Game or Gamification	<p>Game-based learning uses actual games to teach knowledge and skills.</p> <p>Gamification is the technique of adding game elements to a course, such as points, badges, levels, challenges and leader boards, to increase learner engagement.</p>	<ul style="list-style-type: none"> Accessible from any computer with an internet connection, thus eliminating time and cost associated with travel. Available on-demand at a time convenient for the learner. Due to the emotional response achieved, may make learning more effective than other training methods. 	<ul style="list-style-type: none"> IWR needs a platform to deliver the game; either a LMS or website. Cost could be significant for a professional game designer. Solid design is especially important when creating games or a gamified online, self-paced course. Any tool outputting published files to HTML5 is approved. Internal development is not recommended.
Online, Self-Paced Course	Online, self-paced courses are typically delivered through a Learning Management System (LMS) or other website. This type of content is offered to learners on their own time, at any location through the internet.	<ul style="list-style-type: none"> Accessible from any computer with an internet connection, thus eliminating time and cost associated with travel. Available on-demand at a time convenient for the learner to access. 	<ul style="list-style-type: none"> USACE Learning Center is starting to provide online, self-paced courses. The Army and AKO system also have some capabilities. Depending on course complexity, development time can be longer than for synchronous methods. If the course is created by a consultant, any authoring tool that outputs published files to HTML5 is approved. Adobe Captivate or TechSmith Camtasia Software (for internal development) <ul style="list-style-type: none"> This tool is 508 compliant with some exceptions. Technical requirements: (See Appendix A).

Online Education Technology	Description	Benefits	Considerations/Approved Software Information
Virtual Classroom Course	A virtual classroom course resembles a typical “classroom” that is accessed online. This type of course is taught by an instructor, and students access the course by logging into a virtual classroom website using web conferencing software. Content is typically presented on PowerPoint slides that include text, graphics and animation. One example is Blackboard, which is used by the Army and USACE Planning is testing this solution.	<ul style="list-style-type: none"> • Accessible from any computer with an internet connection, thus eliminating time and cost associated with travel. • Provides robust interaction with students. • Supports peer-to-peer collaboration. 	<ul style="list-style-type: none"> • Adobe Defense Connect Online (DCO) or APAN Connect is approved for this purpose; if using a system not already approved, IWR will need to go through appropriate organizational approvals as well as purchasing and implementation. • Content will need to be transferred from a face-to-face to a virtual classroom format, which will take time up front. • Instructors will need to be trained to use the system as a classroom tool. • An internal employee will need to manage logistics of delivering training in this format.
Webinar	A webinar is an online presentation using web conferencing technology, such as the ATT webinar platform. The technology is the same that is used for “Virtual Classroom” above. The webinar is included to explain the difference between recommended uses for the web conferencing software options.	<ul style="list-style-type: none"> • Provides information to a large number of participants. • Accessible to anyone with an internet connection in any location. 	<ul style="list-style-type: none"> • This format is effective for knowledge transfer but not training. • Adobe Defense Connect Online (DCO) is approved for delivering webinars.
Performance Support	Performance support is a resource that users are able to access quickly, during the flow of daily work, to aid them in completing a task. It can be used as a stand-alone resource or as follow up to a formal training course to reinforce skills.	<ul style="list-style-type: none"> • Potentially easy and cost-effective to implement, depending on the resource • Supports knowledge retention outside of a formal training course. • Easily accessible to the learner at the moment of learning need. 	<ul style="list-style-type: none"> • Published files should output to HTML5 instead of Flash. • Depending on technology, ACE-IT approvals might be needed (e.g., mobile apps).

Online Education Technology	Description	Benefits	Considerations/Approved Software Information
Social or Peer-to-Peer Learning	Technology that supports online social or peer-to-peer learning enables geographically dispersed users to collaborate via discussion boards, wikis and social media websites.	<ul style="list-style-type: none"> • Supports informal, one-to-one or group discussions for problem solving and sharing of best practices. • Facilitates a way to locate and connect with subject matter experts. 	<ul style="list-style-type: none"> • Liability issues could occur; social media policies for both internal (intranet) and external-facing platforms are critical within organizations.¹ • Time and effort to use existing social media websites, such as YouTube and LinkedIn are low. • Activities will be subject to USACE social media policies.

¹ See the following information about the Department of Army and USACE social media policy:
 (1) Department of Army Guidance (01 November 2010) on Standardizing Official U.S. Army External Official Presences (social media):

<http://corpslakes.usace.army.mil/socialmedia/Social%20Media%20Standard%20SOP.pdf>;

(2) Department of Army Guidance (17 June 2009) on Use of Social Media in the Army;

<http://corpslakes.usace.army.mil/socialmedia/Social%20Media%20-%20AGC%20Memo.pdf>;

(3) Department of Army (January 2013), The U.S. Army Social Media Handbook, Version 3.1,

<http://www.slideshare.net/USArmySocialMedia/army-social-media-handbook-2011>

Section 1

Introduction

IWR currently teaches a PROSPECT Course on *Risk Analysis for Water Resources Management and Planning*, but there are drawbacks to the current course format. Drawbacks experienced by USACE course participants include:

- The course is structured such that it can accommodate only 24 students, is offered once per year, and requires dedicated on-site instructor time.
- The need to load related course software onto computers so that students are able to practice using the tools and technologies discussed in the course content.
- The limited ability of the instructors to provide individualized feedback.
- Budget constraints restrict travel and attendance, minimizing usability of the course, or possibly placing higher priority on other courses as a part of individual development plans.

Furthermore, USACE has online, self-paced courses that focus on risk analysis through the [Corps Risk Analysis Gateway](#); however, they contain limited exercises and interactivity. Specifically, IWR tasked CDM Smith with researching and evaluating various online options for educational initiatives. These technologies are not limited to their potential use for risk analysis training objectives but for a broad range of internal and external (public) training objectives.

CDM Smith researched online education technologies for IWR's consideration for broadening their educational platforms. The technologies investigated were selected through CDM Smith University's expertise, industry knowledge, and discussions with IWR. Each of the technologies selected were researched to identify its benefits, considerations, and recommended uses. Each technology was evaluated using criteria determined by IWR.

CDM Smith recommends choosing options that best meet USACE's organizational needs based on:

- The level of learning needed,
- Targeted number of participants,
- How participants will access the content,
- Level of effort, and
- Cost.

Using a blended approach that delivers content in different formats, at different times, helps to reinforce the training content and deliver an overall learning solution. Many organizations, including CDM Smith, often use a blended approach (i.e., incorporating multiple delivery methods) to achieve learning outcomes.

Section 2

Research Process

CDM Smith applied the following process to evaluate the online learning options discussed in this paper.

1. Met with IWR to identify the purpose and need for this research paper.
2. Identified technologies based on CDM Smith University's expertise, knowledge of industry and meeting with IWR.
3. Researched technologies to identify benefits, considerations and recommended uses for each.
4. Evaluated online technologies based on criteria determined by IWR, including:
 - A. Cost to government (creation, subscription, and maintenance)
 - B. Ease of access
 - C. Effectiveness in teaching adults
 - D. State-of-the-art practices
 - E. Size of the audience
 - F. Interaction with the audience
 - G. Number of participants reached through medium
 - H. User time commitment
 - I. Barriers or impediments to the user in using the technology (CAC card, Section 508 compliance, complexity, knowledge of technology)
 - J. Policy or ACE-IT restrictions in utilizing the technology
 - K. Level of effort to implement

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Section 3

Online Learning Options

3.1 Learning Management System (LMS)

A learning management system (LMS) is a platform that supports registration, tracking, reporting, evaluation and delivery of online courses. There are three main categories of learning management systems: (1) corporate, (2) academic and (3) integrated LMS/LCMS (Learning Content Management System).

LMSs in the corporate category are most popular with corporations and government agencies in that they “deliver short learning programs and must handle compliance and certification” (Foreman 2013). Examples of corporate systems include [SumTotal](#) and [Success Factors](#).

An academic LMS, on the other hand, “is a system for developing, managing, and delivering content, generally in the context of an online classroom that replaces or augments a physical classroom” (Foreman 2013). [Blackboard](#) and [Moodle](#) are examples of an academic LMS. The Department of the Army has a license available to USACE for Blackboard, so this may be the preferred choice.

The third category of LMSs, LMS/LCMS, is a combination of a corporate LMS with extra capabilities for course design and development. Examples include [CenterPoint](#) and [LearnFlex](#). In addition to these, a custom LMS with specific functionality could be developed for specific needs.

LMSs are beneficial because they automate and streamline training registration, tracking, evaluation, and reporting. For example, employees may log in to the system, browse the course catalog, register for an instructor-led course, take an online, self-paced course, and complete an evaluation for a course he or she concluded. If using an academic LMS, such as Moodle, students can log into the course site and view all course information and materials. Depending on course design, students may use the course site to collaborate with each other using wikis as online discussion forums. This collaborative form of learning allows for a deeper understanding of the material. Some academic LMSs, such as Blackboard, support virtual classroom delivery, which is discussed more in Section 3.3.

In addition to the basic employee role, most LMSs support roles, such as instructor, manager and administrator. These roles are assigned based on how individuals use the system. For example, employees assigned to the instructor role may access the site to view their instructor schedule for planning purposes or to post course materials. Managers may log in to view the courses their employees have completed. In some systems, employees may create development plans that

automatically link to courses in the LMS. While IWR already uses paper-based individual development plans (IDPs), this integrated approach takes them one step further by allowing managers to quickly view the status of these plans, including which courses users have or have not completed, and then use them as a tool for career development discussions with staff. Employees designated as administrators may log in and run evaluation reports to analyze the effectiveness of courses or run a report to determine which courses have the most students on a waiting list to help them plan and schedule future offerings.

While a LMS will provide many benefits, there are some considerations to be aware of, the largest being cost of purchase and time of the initial implementation. To reduce cost, there are some open-source technologies, such as Moodle, which should be considered. Regardless of the system chosen, a LMS implementation is a high-profile project that requires time and energy. For example, organizations need to gain appropriate approvals, assemble an implementation team consisting of stakeholders and representatives from the USACE Information Technology (ACE-IT) office and the USACE Learning Center (ULC), create an implementation and communication plan, and create an infrastructure to manage and maintain the system. Usually, this is done by an internal “LMS administrator” or “training coordinator.” While the level of effort will be high up front, once the system is implemented, there may be time savings in the long run in the form of automated administrative tasks and the ability to offer online courses, career development tools and self-service reporting capabilities.

There are over 500 LMSs available to choose from. Appendix B contains a list of learning management systems that appear on lists touting “the best 20” or “top 10 LMSs” of 2014. On those top of 2014 lists, several LMSs appear in multiple lists but are not necessarily ranked at the same level. Differences in rankings are due to the differences in valued features, i.e., one list may be prioritized by the number of recommendations the LMS has earned, another may have more weight valued on the user interface, or another value may be cost. Features included in the ranking process are user interface, support and service, popular features, adaptability, consumer feedback, vertical reach, dashboard, and social capabilities. Many of the LMSs also have capabilities for some of the other technologies listed in this paper such as virtual classroom and online self-paced programs.

3.2 Webinar

Webinars are presentations that are delivered by a presenter or presenters that can reach a broad audience via an online conferencing system. During a webinar, the presenter delivers information to participants, using Microsoft PowerPoint or similar software and the sessions typically last between 30 to 60 minutes.

Features of webinar platforms such as [Adobe Acrobat Connect Pro](#) (a version of this is currently used by the DoD through the Defense Connect Online or on APAN Connect), [Cisco WebEx](#), and [AT&T Connect](#) (which is currently used by the Corps), include audience tracking, a white board with annotation capabilities, simultaneous public and private messaging, session recording, mobile access, live polling, live chat for Q&A, and live desktop sharing capabilities. A list of webinar platforms is provided in Appendix B.

Values in using webinars include:

- Webinars provide quick and easy access to the latest trends and industry development at your PC, materials offered in PDF can be saved to computer for easy referral.
- Content of webinars are digital and easily archived.
- Ease of communication with the speaker and other participants using discussion group technology.
- Webinars can include real-world examples through the use of hyperlinks.
- Use Voice over Internet Protocol (VoIP) technology instead of dialing in through a phone line enabling Q&A sessions.

Cons of using a webinar as an education tool:

- Webinars are, for the most part, a one-sided conversation.
- This type of one-sided presentation is not “training” but is merely a transfer of information.
- Slides and other materials need to be dynamic and polished.
- Rehearsal time is significant.
- It is important for the presenter/speaker to be practiced.
- Too often, the webinar audience is multi-tasking during the webinar (MacArthur 2009).

To develop an effective webinar training course, a systematic instructional design process must be used to ensure students are able to meet learning objectives by participating in exercises and demonstrating proficiency of the learned material. Presentations, without interaction between the instructor and participants, cannot support this type of learning, since participants do not have the opportunity to practice and demonstrate proficiency in the skills the presenter discusses. However, this platform may be used to offer online training courses that have been created using an instructional design process. These are called virtual classroom courses and are discussed in the next section.

3.3 Virtual Classroom Course

Training courses that occur at a scheduled time, are led by an instructor, and are delivered in an online format are typically referred to as virtual classroom courses. This is because the format resembles a typical “classroom” that is accessed online. Participants access the course by logging into a virtual classroom website using web conferencing software, such as Adobe Connect, WebEx, or Blackboard (available through the Blackboard LMS). Students may access audio through VoIP or conference calling. Content is typically presented on PowerPoint slides that include text, graphics, and animation. Video is also available on most platforms, but the effectiveness of this feature is dependent upon bandwidth capabilities.

Benefits of using this format are:

- Instructors and students can access the virtual classroom from any computer with an internet connection, which eliminates travel costs and limits time commitments.
- Real-time access to an instructor for questions and clarification.
- Peer-to-peer collaboration through verbal discussions, wikis, and chat feature.
- Interactive exercises using:
 - Poll slides in which students are presented with a question and are asked to select the correct answer from a list of options. The software tallies the results instantly, and can be displayed to learners.
 - Whiteboard slides on which students type or draw feedback.
 - Virtual breakout rooms that allow students to work on exercises in small teams, such as case studies, role plays and scenarios.

IWR already has access to Adobe Connect (DCO – Defense Connect Online and APAN Connect) and Blackboard, so these could be leveraged as a virtual classroom system. If IWR prefers to use a different system, they will need to go through the appropriate organizational approval process and consider the cost of the system, licenses, and audio costs associated with use. Also, the size of the audience is dependent on license quota of an individual vendor agreement. If using conference calling, the provider would also have a maximum number of lines available, which would need to be considered. When selecting a virtual classroom system, it is important that the system supports the following functions:

- Files can be loaded and displayed
- File transfer (to allow students to download handouts, such as participant guides and group exercise information)

- Audio, either through VoIP or conference calling
- Application share
- Annotation tools that allow the instructor and participants to draw or type on screen
- Feedback indicators
- Polling
- Chat
- Breakout rooms
- Recording

In addition to offering internal courses, employees could also enroll in existing virtual classroom courses through open-source websites such as [Coursera](#). Coursera offers a wide variety of free, online courses that are taught by university professors. EdX is another site with online course offerings that are live or self-paced. Using the virtual classroom format, students complete courses over a certain number of weeks (depending on the course) and use the virtual classroom tools listed above to interact with the professor and other students. However, due to the nature of open-source courses, IWR would not have control over scheduling or number of course offerings. This could present issues if IWR is considering using this technology as a solution for organization-wide training.

IWR should be aware of the following when training through a virtual classroom format.

- Virtual classroom courses are accessible online, but they are scheduled for a specific timeframe, so learners and the instructor would need to be available during those times.
- It is difficult to keep online learners engaged for longer periods of time (Shank 2010). Therefore, virtual classroom sessions should be limited to 2 hours maximum, with plenty of interaction to reduce multi-tasking.
- The virtual classroom instructor must be well versed in online facilitation skills to keep users engaged and to determine if students understand the material.
- Shank also recommends using a producer for live sessions. This role is responsible for scheduling practice sessions, training facilitators, managing technical issues during the class, and managing the application during the class (Shank 2010).

If IWR decides to take advantage of existing virtual classroom courses, they would need to identify technical requirements for access to the course website. Sites like Coursera are easy to use, only require an internet connection, and special software is not required to view the course material. However, other sites could have different requirements.

There is some effort required to offering internal courses in a virtual classroom format. In addition to creating the course content, logistical efforts must be considered. For example, IWR would need someone to schedule the course, create the virtual classroom session, obtain log-in information, send the course invitation and send any follow-up course information. However, with the infrastructure created, IWR would be able to offer training courses to participants across the country without associated travel time and costs. Using this technology, courses could include collaborative exercises, such as case studies, allowing students to work together on specific risk analysis problems. Using this format, students can present their work to the larger group and receive immediate feedback from the instructor as well as their peers. In brief, virtual classroom training should be considered as an effective alternative to face-to-face training.

3.4 Online, Self-Paced Course

Online, self-paced courses are delivered to learners on their own time, at any location through the internet. Online, self-paced courses can take many forms. The most basic form is content that is presented to learners using text, animation, and narration. The USACE Learning Center is starting to create and offer PROSPECT courses online. EdX also offers self-paced online courses. A test is often included to assess knowledge of the content. This type of course works best for knowledge transfer or awareness training. However, to achieve a higher level of learning, such as application of learning to on-the-job performance, online, self-paced courses must include exercises that allow learners to practice and apply the skills in a safe environment with appropriate feedback and access to performance support. Methods to achieve this include scenarios and games. Games and gamification are discussed in Section 3.5.

Using scenarios will provide a deeper level of learning by offering learners an opportunity to practice decision-making skills in a safe environment. Scenarios can be simple or complex. Learners are presented with a real-life situation in which they must decide how to respond. This allows learners to see the immediate value of the exercise and move beyond knowledge transfer to application of learning. This type of training could be stand alone or incorporated into existing tools.

Benefits of this delivery method include some of the following:

- Learners can access the content from any computer with an internet connection, which eliminates travel time and cost.
- Content can be delivered to an unlimited number of learners.
- Content can be updated and distributed to learners quickly.

- Courses can be delivered in a self-directed format that is available to learners at the time of learning need.
- Adults have different learning styles, such as observing, listening or working on an exercise.

Online, self-paced courses can accommodate all of these preferences.

As noted above, online, self-paced courses can take many forms and recommended uses dependent on organizational objectives. For example, a simple course, such as a narrated presentation with a cumulative assessment at the end, is suitable for knowledge transfer or awareness training. IWR could consider using this form of training for risk analysis introductory and background information, definitions, and policy awareness. If the goal of training is performance improvement, IWR should consider the use of scenarios. “This helps people practice such skills as:

- Recognizing and challenging their own assumptions
- Recovering from mistakes in a long or complex process
- Navigating extended, ambiguous situations
- Deciding when to stop gathering information and act.” (Moore 2013)

IWR could consider using scenarios to address specific challenges with risk analysis, such as how to identify high-level versus low-level risks, when to stop performing risk analysis, and how to use a risk framework to make decisions.

While there are many benefits of using online, self-paced courses to deliver training, there are some provision and costs considerations as well. First and foremost, these courses require an LMS if tracking of completion is required. Cost is also a factor. If IWR uses an instructional designer or partners with a university to create the courses, they will need to consider the design fee as well as time spent with an internal subject matter expert (SME) to provide course content. Authoring tool fees should be considered only if IWR plans to create the course internally or the instructional designer or university does not have the tool. Otherwise, there is not a need for IWR to purchase authoring tools. Recently, IWR has moved away from using Flash, since this technology does not run on mobile devices. HTML5 (a markup-up language for presenting web-based content) does run on mobile devices, so any authoring tool used would need to use this technology. If IWR does decide to create the courses internally, they could use either Adobe Captivate or TechSmith Camtasia, both of which are already approved for use on USACE equipment by ACE-IT. Adobe Captivate prices range from \$20/month to \$900 for ownership. TechSmith Camtasia can be bought for approximately \$300 which does not include government discounts.

The level of effort for creating online, self-paced training can be high depending on course design. However, once the course is produced and loaded in an LMS, effort is complete unless the course requires updates.

3.5 Games and Gamification

Game-based learning and gamification are two different types of training methods. Game-based learning uses actual games to teach knowledge and skills. Gamification uses game strategies and mechanics in a non-game context to engage users and solve problems. Learners participate in learning activities that include elements of gaming, i.e., earning points or receiving badges for accomplishing tasks correctly (Kapp 2014).

Games are similar to scenarios in that they present real-life challenges to learners who are then able to apply what they have learned by making decisions based on their learning experience. In addition, games are especially effective for skills involving risk while learning in a safe environment. Players are encouraged to take risks, explore, and try new things.

Simply playing a learning game, however, does not ensure application to job performance. Enders quotes Traci Sitzmann's findings that "... games were most effective when they were:

- One component within a larger training strategy
- An active learning experience versus a passive experience
- Designed to engage the learner through intrinsic motivation, resulting in learners playing multiple times
- Followed by debriefing to reinforce workforce applicability" (Enders 2013)

Games range from self-paced training, to mobile application games, or complex scenarios. The largest consideration for games is cost. Enders (2013) provides an example by explaining that McDonald's Japan spent 2.2 million dollars to develop one game and buy two Nintendo DS systems for each of their stores. However, this cost was spread over 3,800 stores, and McDonald's Japan reported that the game reduced new employee training by half (Enders 2013). Even with that information, games can still be price prohibitive. If this is the case, gamification, which is less expensive, should be considered.

The science behind gamification identifies two learning practices, retrieval and spaced retrieval. These two techniques used together improve learning and retention. Retrieval practice requires the learner to remember information rather than seek it out. Spaced retrieval requires the learner to recall information over a period of time (Kapp 2014).

Gamification provides instant gratification by awarding points, badges, new levels of challenges to conquer, and leader boards to increase learner engagement. Improving one's score or personal "best" also makes games appealing. Both strategies can be used to engage learners and reach the application level of Bloom's taxonomy of learning domains.² As BunchBall.com explains, "The addition of game mechanics to a site or application allows you to layer compelling user experiences into existing activities. These gamified activities satisfy basic human desires, creating the addictive user experiences that motivate users to take certain actions" (BunchBall 2010).

A valid concern in using gamification for training lies in ensuring it is designed well. Enders explains, "Successful gamification requires solid design and, unfortunately, too many organizations are not utilizing game designers or even engaging designers in the process. As a result, Gartner predicts that by 2014, 80 percent of current gamified applications will fail to meet their business objectives primarily because of poor design" (Enders 2013).

If IWR decides to create a custom game to deliver training, a professional game designer must be used. The level of effort for the game will be determined and completed by the game designer, but the service could be expensive. If this is not possible, an instructional designer may be used to add game elements to an online, self-paced course.

A list of possible gamification vendors is listed in Appendix B.

3.6 Performance Support

Essentially, performance support is a resource that employees access in the flow of daily work to help them complete a task. Examples of low-tech performance support that can be created quickly and cheaply are an infographic that depicts a process, a document that lists commonly used terms and definitions, or a quick reference guide for a software program. More sophisticated examples include video tutorials for software programs and mobile applications (apps) that support work tasks. In IWR's case, performance support could be created for a process in the risk manual. A short video that explains the process and provides tips for on-the-job implementation could be posted on an internal website that is easily accessible to staff. Employees should be more willing to use this video, since they could access it quickly without looking for the information in the manual.

In addition to posting independent resources, performance support can also be used to reinforce information from a training class. Rosenberg (2013) lists the advantages of this approach:

² Bloom's taxonomy refers to dividing educational objectives into three domains: cognitive, affective, and psychomotor (see Orlich et al., 2004).

- A lower overall cost of competence, with less retraining.
- Higher performance and productivity levels than could be achieved with formal training alone.
- Shorter training times as performance support in the workplace helps improve productivity in the context of doing the job. (The productivity of a worker in training is zero; any strategy getting people back to work quicker enhances organizational efficiency.)
- Less on-the-job performance degradation (Rosenberg 2013).

While performance support has many benefits, as described above, the content must be well designed and targeted to the user's needs to be useful. Performance support can be developed for very little cost and effort, such as in the case of infographics and quick reference guides. These types of low-technology solutions should not be overlooked, as they have the potential to meet users' needs just as well as more sophisticated solutions. However, if IWR chooses to create a high-technology solution, such as a video tutorial, they would need to consider the cost of design and development as well as a location to post the published files. Low-technology resources, such as a document, could be posted on any internal drive accessible to staff.

3.7 Social or Peer-to-Peer Learning

While social learning is not new, providing technologies to enable online collaboration for social learning is relatively new. These technologies include wikis, blogs and social media websites, and applications (e.g., Twitter and LinkedIn). "Social networks were used by 76.6 percent of respondents, blogs were used by 56.9 percent of respondents, and instant messaging was used by 53 percent of respondents for informal and social learning" (Shank 2013). Bozarth (2011) found that organizations are using these technologies in a number of ways, such as delivering courses with a social media component, delivering stand-alone content and facilitating online communities of practice. Social or peer-to-peer learning has many benefits for learners. Ben Betts explains the benefits for social or peer to peer learning as "the ability to learn from more experienced peers, the ability to compare one's performance with others, and the ability to take part in collaborative learning communities" (Betts 2012). Betts also identified practical applications, which are summarized below:

- Engaging in informal, one-to-one or group discussions
- Posting questions and receiving answers from a group (regardless of location)
- Collaborating to solve problems
- Learning from one another's experiences
- Sharing of best practices
- Connecting with experts

Organizations have a number of options for using a social media system to support learning. These options include implementing a system such as Yammer or an LMS that supports social learning. In addition to these platforms, which require a cost, IWR could continue to make use of websites that are available to the public for free, and that many people already use, such as YouTube.³ YouTube allows users to upload their own videos and view videos that others have uploaded. In addition to information sharing, users can also collaborate by posting comments and questions for discussion, enabling them to obtain answers quickly from the original poster as well as others who have watched the video. These capabilities are available in Sharepoint and APAN.org. This could be used as informal learning, or IWR could consider incorporate viewing and discussing a YouTube video as pre-work or homework to a formal training course. Use of these types of platforms would require following USACE and Department of the Army guidance for social media (see footnote 1) if used in a public form. Burke (2011) provides an overview of USACE social media policies and presence.

Another example of an education website that incorporates social learning is the language education website [Busuu](#). This system allows users to learn a language by completing formal learning modules, by working with native speakers through a video-chat application or having fellow users correct written answers. Systems like this make use of individuals' expertise and depart from the idea that learning is only accessible via a "trainer" or "teacher."

While there are many benefits of engaging in social learning, there are some items to consider. First, IWR should be aware of liability issues. It's important that employees not reveal sensitive organizational information on an external site. Also, depending on the site and software required for use, a proponent would likely need to go through an approval process.

3.8 Online Learning Options Summary

In summary, the effectiveness of the online learning options presented above depends on the content being delivered, ease of access, number of learners, level of collaboration desired, and design that supports adult learning principles. It is important to balance these criteria with USACE's organizational needs, such as cost, policies, timing and level of effort. Lastly, a training solution should not be limited to one option. Instead, IWR should consider implementing a blended approach that delivers content in different formats, at different times. This approach helps to facilitate an overall learning solution that supports learners in formal training situations as well as on-the-job.

³ The USACE has a YouTube site: <https://www.youtube.com/user/CORPSCONNECTION>

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Section 4

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Appendix A: Technical Specifications

Adobe Captivate 8

Website: <http://www.adobe.com/products/captivate.html>

System Requirements

Windows

- 1 GHz or faster processor Intel® Pentium® 4, Intel Centrino®, Intel Xeon®, or Intel Core™ Duo (or compatible) processor
- Microsoft® Windows® XP with Service Pack 3, Windows 7 with Service Pack 1, or Windows 8/8.1
- Microsoft® Office 2003, Microsoft® Office 2007, Microsoft® Office 2010 and Microsoft® Office 2013
- 2GB minimum RAM (4GB recommended)
- 3GB of available hard-disk space for installation; additional free space required during installation (cannot install on flash-based storage devices)
- Adobe Flash® Player 10, Adobe Flash® Player 11 software for viewing multimedia content
- DVD-ROM drive
- 1024x768 display (1280x1024 recommended) with 16-bit video card
- Broadband Internet connection required for online services and to validate Subscription Edition (if applicable) on an ongoing basis*— For updates to system requirements, visit www.adobe.com/go/cp_sysreq
- This software will not operate without activation. Broadband Internet connection and registration are required for software activation, validation of subscriptions, and access to online services.* Phone activation is not available. Adobe online services and other third-party online services are available only to users 13 and older and require agreement to additional terms and/or Adobe's online privacy policy www.adobe.com/go/terms . Online services are not available in all countries or languages, may require user registration and may be subject to change or discontinuation without notice. Additional fees or subscription charges may apply.

Mac OS

- Mac OS X v10.7, v10.8, v10.9, iOS 7.0.3 (for iPad)
- 2GB minimum RAM (4GB recommended)
- 3GB of available hard-disk space for installation; additional free space required during installation (cannot install on a volume that uses a case-sensitive file system or on flash-based storage devices)
- DVD-ROM drive
- 1024x768 display (1280x1024 recommended) with 16-bit video card
- Broadband Internet connection required for online services and to validate Subscription Edition (if applicable) on an ongoing basis*.—For updates to system requirements, visit www.adobe.com/go/cp_sysreq.

- This software will not operate without activation. Broadband Internet connection and registration are required for software activation, validation of subscriptions, and access to online services.* Phone activation is not available. Adobe online services and other third-party online services are available only to users 13 and older and require agreement to additional terms and/or Adobe's online privacy policy www.adobe.com/go/terms . Online services are not available in all countries or languages, may require user registration and may be subject to change or discontinuation without notice. Additional fees or subscription charges may apply.

You must accept the license agreement and warranty terms to use this product.

See www.adobe.com/go/eulas for details. Product activation via the Internet is mandatory within 30 days from installation. See www.adobe.com/go/activation for details.

Camtasia Studio

Website: <http://www.techsmith.com/camtasia.html>

Minimum Requirements for Windows Version:

- Microsoft Windows XP, Windows Vista, Windows 7, or Windows 8
- Microsoft DirectX 9 or later version
- Microsoft .NET 4.0 (included)
- Dual-core processor minimum ~ Recommended: Quad-core processor or better
- 2 GB RAM minimum ~ Recommended: 4 GB or more
- 2 GB of hard-disk space for program installation
- Display dimensions of 1024x768 or greater
- Dedicated Windows-compatible sound card, microphone, and speakers (recommended)

Feature-Specific Requirements:

- Camtasia Studio Add-in for PowerPoint requires PowerPoint 2007 (32-bit) or PowerPoint 2010 or 2013 (32-bit or 64-bit)
- Import of .mov and production to .mov and .m4v requires Apple QuickTime 7.2 or later
- Playback using the Smart Player is supported on Internet Explorer 8+, Chrome, Firefox, Safari 5.1+, iOS 5+, Android 4+ (Chrome for Android Recommended)
- Camera video recording requires a USB Web Camera. Recording live from a DV camera is not supported
- Integration with Camtasia Relay requires Camtasia Relay Client Recorder
- GPU acceleration requires DirectX 9 compatible video adapter with 128 MB of video memory or greater and Pixel Shader 2.0 or later

Minimum Requirements for Mac Systems

- Mac computer with an Intel processor
- Mac OS X v10.6.6 or later
- Quartz Extreme support (rendering is not supported on external USB monitors)
- 2GB of RAM
- 4GB of available disk space (minimum)
- QuickTime X or later
- Playback using the Smart Player is supported on Internet Explorer 8+, Chrome, Firefox, Safari 5.1+, iOS 5+, Android 4+ (Chrome for Android Recommended)

Recommend Requirements:

- Mac computer with an Intel processor (dual core 2.0GHz or faster)
- 4GB of RAM or greater

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Appendix B: eLearning Platforms

Learning Management Systems

Top LMS Platforms 2014						
	Top 10 e-learn 2013	Best 20 2014**	e/learn 24/7 blog	Software Advice 2014	S'ware Comparison 2014	blogs.butler.edu 2011-2012
1	Kineo	Moodle (Open Source)	Expertus One	Success Factors - 4 Star	SumTotal Systems	Commercial software
2	Allen Communication	Edmodo	Growth Engineering	Ziiva	Cornerstone Learning	Blackboard
3	Cegos	Connect EDU	Blackboard	Sage HRMS	Saba Learning Suite	Angel
4	GP Strategies	Blackboard	Instructure	Halogen - 4.5 star	e-Doceo LMS	WEBCT
5	SkillSoft	SumTotal Systems	e-Logic Learning	EPICOR - 4 star	Kenexa LMS	Desire2Learn
6	Pearson	Cornerstone	IMC Learning Suite	Infini Source	CertPoint	Pearson's
7	Allen Interactions	Schoology	Docebo	Vibe	Learn Center	Edvance 360
8	Tata Interactive	Success Factors (SAP)	Biz Library	FairSail	IMC Learn Center	Jenzabar e-Racer
9	Designing Digitally	Collaborize Classroom	Meridian	Triton	Success Factors	SharePoint by Elearning Force
10	Aptara	SkillSoft	CM Group LTD		Meridian Global	
11		Desire2Learn				Open Source software
12		NetDimensions				Moodle
13		Instructure				Sakai
14		Docebo				Canvas by Instructure
15		Interactyx				Loud Cloud
16		DigitalChalk				OLAT
17		Latitude Learning				Claroline
18		eFront				
19		Inquisiq3				
20		Meridian Knowledge Solution				

Colored cells identify systems appearing in multiple lists.

Note: some systems may use features or subsystems of another LMS such as Pearson using Cornerstone's Cornerstone on demand.

Webinars

Top Webinar Platforms 2014				
	Practical Ecommerce	Forrester Research*	2014 Best Webinar**	No1 Reviews.com
1	Adobe Acrobat Connect Pro	Microsoft Live Meeting (Lync or OCS)	MegaMeeting	Go To Webinar
2	Cisco WebEx	Cisco WebExCitrix GoTo Meeting	Adobe Connect 8	Click Webinar
3	GoToWebinar	Citrix GoToMeeting	Cisco WebEx	Adobe Connect
4	LotusLive	AT&T Connect	Infinite	Cisco WebEx
5	Microsoft Office Live Meeting	IBM (LotusLive or Sametime)	ClickWebinar	Omnovia
6	Verizon Small Business Web Conferencing	Adobe Connect	GoToWebinar	Huddle
7	AnyMeeting	Avaya Meeting Exchange	InstantPresenter	Instant Presenter
8	Comapping	Global Crossing Web Meeting	Video Seminar Live	InterCall Webcast Studio
9	Fuze Meetings	InerCall	iLimo	Infinite Conferencing
10	GatherPlace	join.me	Microsoft Office Live Meeting	Zoho Meeting
11	iLine	Novell	FuzeMeeting	
12	InterCall		Vyew	
13	onNovia		InterCall Unified Meeting	
14	Ready Talk			
15	Yugma			
16	Zoho			

* Determined by most frequently used.

** Criteria used are categorized as features, audio/video, help & support, and compatibility.

Gamification

Gamification is a fairly new concept that began in 2008 and hit a notable high in 2012 only to continue growing in 2013. A search for possible gamification vendors, in addition to those listed in the text, led to the *Gamification Buyer's Guide*, <http://www.gamification.co/vendors/>.

At this time, there does not yet seem to be a rating list of gamification vendors. The list below is a result of searching for gamification vendors using the criteria of: (1) industry = government, and (2) pricing model = user-based. Nineteen vendors matched that criteria and are listed below in alphabetical order.

1. Badgeville
2. Bennu
3. Echo.it
4. ExpertOffice
5. Gaminside
6. Hoopla Software
7. IndusGeeks
8. IsaaCloud
9. Kazooky Loyalty
10. Optic Bridge Technologies
11. Leaderboarded
12. Playbasis
13. Playful Meme
14. PlayGen
15. Pug Pharm Productions, Inc.
16. PunchTab
17. Rocketfuel Games
18. Venture Spirit
19. Winnova

U.S. Army Corps of Engineers Institute for Water Resources

The Institute for Water Resources (IWR) is a U.S. Army Corps of Engineers (USACE) Field Operating Activity located within the Washington DC National Capital Region (NCR), in Alexandria, Virginia and with satellite centers in New Orleans, LA; Davis, CA; Denver, CO; and Pittsburg, PA. IWR was created in 1969 to analyze and anticipate changing water resources management conditions, and to develop planning methods and analytical tools to address economic, social, institutional, and environmental needs in water resources planning and policy. Since its inception, IWR has been a leader in the development of strategies and tools for planning and executing the USACE water resources planning and water management programs.

IWR strives to improve the performance of the USACE water resources program by examining water resources problems and offering practical solutions through a wide variety of technology transfer mechanisms. In addition to hosting and leading USACE participation in national forums, these include the production of white papers, reports, workshops, training courses, guidance and manuals of practice; the development of new planning, socio-economic, and risk-based decision-support methodologies, improved hydrologic engineering methods and software tools; and the management of national waterborne commerce statistics and other Civil Works information systems. IWR serves as the USACE expertise center for integrated water resources planning and management; hydrologic engineering; collaborative planning and environmental conflict resolution; and waterborne commerce data and marine transportation systems.

The Institute's Hydrologic Engineering Center (HEC), located in Davis, CA specializes in the development, documentation, training, and application of hydrologic engineering and hydrologic models. IWR's Navigation and Civil Works Decision Support Center (NDC) and its Waterborne Commerce Statistical Center (WCSC) in New Orleans, LA, is the Corps data collection organization for waterborne commerce, vessel characteristics, port facilities, dredging information, and information on navigation locks. IWR's Risk Management enter is a center of expertise whose mission is to manage and assess risks for dams and levee systems across USACE, to support dam and levee safety activities throughout USACE, and to develop policies, methods, tools, and systems to enhance those activities.

Other enterprise centers at the Institute's NCR office include the International Center for Integrated Water Resources Management (ICIWaRM), under the auspices of UNESCO, which is a distributed, intergovernmental center established in partnership with various Universities and non-Government organizations; and the Conflict Resolution and Public Participation Center of Expertise, which includes a focus on both the processes associated with conflict resolution and the integration of public participation techniques with decision support and technical modeling. The Institute plays a prominent role within a number of the USACE technical Communities of Practice (CoP), including the Economics CoP. The Corps Chief Economist is resident at the Institute, along with a critical mass of economists, sociologists and geographers specializing in water and natural resources investment decision support analysis and multi-criteria tradeoff techniques.

The Director of IWR is Mr. Robert A. Pietrowsky, who can be contacted at 703-428-8015, or via e-mail at: robert.a.pietrowsky@usace.army.mil. Additional information on IWR can be found at: <http://www.iwr.usace.army.mil>. IWR's NCR mailing address is:

U.S. Army Engineer Institute for Water Resources
7701 Telegraph Road, 2nd Floor Casey Building
Alexandria, VA 22315-3868



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